

## WHAT IS CLAIMED IS:

- 1        1.        An apparatus comprising:  
2                a substrate; and    ✓  
3                a carbon nanotube layer deposited on the substrate, the carbon nanotube layer  
4                including an alkali material.    ✓
- 1        2.        The apparatus as recited in claim 1, wherein the alkali material is deposited as a layer  
2                onto the carbon nanotube layer.
- 1        3.        The apparatus as recited in claim 1, wherein the alkali material is doped into the  
2                carbon nanotube layer.
- 1        4.        The apparatus as recited in claim 1, wherein the alkali material is intercalated with  
2                the carbon nanotube layer.

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- 1        5.     An apparatus comprising:  
2             a substrate; and  
3             a carbon nanotube layer deposited on the substrate, the carbon nanotube layer  
4             including a separate low work function material.
- 1        6.     The apparatus as recited in claim 1, wherein the low work function material is  
2             deposited as a layer onto the carbon nanotube layer.
- 1        7.     The apparatus as recited in claim 1, wherein the low work function material is doped  
2             into the carbon nanotube layer.
- 1        8.     The apparatus as recited in claim 1, wherein the low work function material is  
2             intercalated with the carbon nanotube layer.
- 1        9.     The apparatus as recited in claim 1, wherein the low work function material is an  
2             alkali material.
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1 10. A field emission apparatus comprising:  
2 a cathode comprising:  
3 a substrate; and  
4 a carbon nanotube layer deposited on the substrate, the carbon nanotube layer  
5 including an alkali material.

1 11. The apparatus as recited in claim 10, wherein the alkali material is deposited as a  
2 layer onto the carbon nanotube layer.

1 12. The apparatus as recited in claim 10, wherein the alkali material is doped into the  
2 carbon nanotube layer.

1 13. The apparatus as recited in claim 10, wherein the alkali material is intercalated with  
2 the carbon nanotube layer.

1 14. The apparatus as recited in claim 10, further comprising a conductive layer deposited  
2 between the substrate and the carbon nanotube layer.

1 15. A method for making a field emission cathode comprising the steps of:  
2 providing a substrate;  
3 depositing a carbon nanotube layer on the substrate; and  
4 inserting an alkali material into the carbon nanotube layer.

1 16. The method as recited in claim 15, wherein the inserting step further comprises the  
2 step of:  
3 depositing a layer of the alkali material on the carbon nanotube layer.

1 17. The method as recited in claim 15, wherein the inserting step further comprises the  
2 step of:  
3 doping the carbon nanotube layer with the alkali material.

1 18. The method as recited in claim 15, wherein the inserting step further comprises the  
2 step of:  
3 intercalating the alkali material into the carbon nanotube layer.